



## Group Firing System for Firework Unit

### Field of the Invention

The present invention relates to a group firing system for connectable firework, which is in the field of pyrotechnics.

### Background of the Invention and Prior Art

Fireworks as a kind of festivity products is enjoyed by people, especially, used in grand ceremony and ceremonial festival. It can not be replaced by any other forms, such as the light, sound, and color. ~~It could not only warmly stand out the main subject, but also can leave endless imagination to each person.~~ The firing of the fireworks can not only strongly stand out a main subject, but also can leave endless imagination to each people. But such kind of firework-display party is limited by some professional conditions, thus, could not be realized by normal consumers. The main reason is that the conventional firework unit is unattached with each other. It could not be connected together by normal consumers.

Therefore, if we could change the structure of the firework unit, the ~~people~~ consumer could operate the firework display party by themselves.

### Brief Description of the Invention

The object of the present invention is to provide a new firing system for the firework unit. Thus, the consumers can arrange the firework display by themselves, then it could bring more attractive effect than before.

In one aspect, the present invention relates to ~~The group firing system for fireworks unit of the present invention~~ as follows: a group firing system having a plurality of fireworks units, comprising:

the fireworks unit (A1, A2, A3, A4, ..., B1, B2, B3, B4, ..., C1, C2, C3, C4, ...) each including a plurality of firing shot tubes (A, B, C, ...), the firing shot tubes having a firstly firing shot tube (A) and a final firing shot tube (T), the firing shot tubes connected with each other through inner fuses (7);

characterized in that,

a lower fuse tube (2) and an upper fuse tube (2') disposed in each of the fireworks units;

each end of the lower and upper fuse tubes (2, 2') having a socket (3), the fuse tubes connected to each other with soft fuse hoses (L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub>, ...) inserted in the sockets for forming the fireworks group each of the soft fuse hoses (L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub>, ...) containing outer fuses;

a firstly fuse (6) provided in the lower fuse tube (2) and a final fuse (6') provided in the upper fuse tube (2'), in which the firstly fuse (6) linked with the inner fuse (7) from the firstly firing shot tube (A) and the final fuse (6') linked with the inner fuse (7') from the final firing shot tube (T).

Preferably, the lower fuse tube (2) positioned in a lower section of the fireworks unit, and the upper fuse tube (2') positioned in an upper section of the fireworks unit.

Preferably, a said soft fuse hose (L) containing the outer fuse inserted in one of the sockets (3) of the lower fuse tube (2) of a fireworks unit, a said soft fuse hose (L) containing the outer fuse inserted in one of the sockets (3) of the upper fuse tube

(2') of the fireworks unit and inserted in one of the sockets (3) of the lower fuse tube (2) of the other fireworks unit, a said soft fuse hose (L) containing the outer fuse inserted in one of the sockets (3) of the upper fuse tube (2') of the other fireworks unit, so that the group firing system is connected in series attached fashion.

Preferably, a said soft fuse hose (L) containing the outer fuse inserted in one of the sockets (3) of the lower fuse tube (2) of a fireworks unit, a said soft fuse hose (L) containing the outer fuse inserted in the other socket (3) of the lower fuse tube (2) and inserted in one of the socket (3) of the lower fuse tube (2) of the other fireworks unit, a said soft fuse hose (L) containing the outer fuse inserted in the other socket (3) of the lower fuse tube (2) of the other fireworks unit, so that the group firing system is connected in parallel attached fashion.

In another aspect, the present invention relates to a fireworks unit, including a plurality of firing shot tubes (A, B, C, ...), the firing shot tubes having a firstly firing shot tube (A) and a final firing shot tube (T), the firing shot tubes connected with each other through inner fuses (7); characterized in that,

a lower fuse tube (2) and an upper fuse tube (2') disposed in the fireworks unit;

each end of the lower and upper fuse tubes (2, 2') having a socket (3); a firstly fuse (6) provided in the lower fuse tube (2) and a final fuse (6') provided in the upper fuse tube (2'), in which the firstly fuse (6) linked with the inner fuse (7) from the firstly firing shot tube (A) and the final fuse (6') linked with the inner fuse (7') from the final firing shot tube (T).

~~A. 1-2 paper fuse tubes is provided within the firework unit, which links with the fuse of the firework unit, each end of the paper fuse tubes has socket; the fuse is provided within the paper fuse tubes;~~

~~B. the sockets of the firework units are connected into a firework group through soft fuse hoses.~~

~~Preferably the paper fuse tubes in the firework unit is connected to the adjacent one in series, that is, one end of the lower paper fuse tube in firework unit is connected with soft fuse hose, and one end of the upper paper fuse tube, thereof is connected with the lower paper fuse tube in another firework unit the connection is repeated.~~

~~Preferably, each of the two adjacent firework units are connected with the lower paper fuse tube thereof through the soft fuse hose, that is, the firework units are connected in parallel.~~

~~Preferably, the fuse in the paper fuse tube of the firework unit is connected to a firstly firing shot tube through a derivative fuse, and the shot tube is connected to the other shot tubes in turn through inner fuse.~~

~~Preferably, the fuse in the paper fuse tube is connected to a final firing shot tube through a derivative fuse.~~

With the structure mentioned, the conventional firework units can be fired in a group without the limitation of the place and the time. The consumer has more greatly enjoyable at sight of display fireworks.

## Brief Description of the Drawings

Figure 1 shows the structure of this invention;

Figure 2 shows inner structure of firework unit;

Figure 3 shows the series connection structure;

Figure 4 shows the parallel connection structure;

Figure 5 shows the sectional view taken along line aa' in Figure 2;

Figure 6 shows the sectional view taken along line bb' in Figure 2;

Figure 7 shows the structure of firework unit provided with single one paper fuse tube;

In the figures:

1, shot tube; 2, ~~upper~~ lower paper fuse tube; 2', ~~lower~~ upper paper fuse tube; 3, sockets; 6, firstly fuse; 6', ~~derivative~~ final fuse; 7, 7', inner fuse.

A<sub>1</sub>-A<sub>4</sub>, B<sub>1</sub>-B<sub>9</sub>, C<sub>1</sub>-C<sub>2</sub> indicate three kinds of fireworks unit with different shapes;

L<sub>1</sub>-L<sub>14</sub> indicate soft fuse hoses containing outer fuse.

## Detailed Description of Preferred Embodiments

The present group firing system is developed on the conventional firework units to make it possible to connect the firework units for group display show.

The reason that we could carry out this system is that we have changed the firework' structure. It is composed of some shot tubes 1. It is installed with two lower and upper paper fuse tubes 2, 2'. And the structure between the paper fuse tube 2, 2' and the shot tube 1 as shown in Figures 2, 5, 6.

In particular, as shown in Figures 2, 5, 6, a fireworks unit includes a plurality of firing shot tubes 1 (A,B,C,.....). The firing shot tubes 1 has a first firing shot tube A and a final firing shot tube T. The firing shot tubes are connected with each other through inner fuses 7. A lower fuse tube 2 and an upper fuse tube 2' are disposed in the fireworks units. Each end of the lower and upper fuse tubes 2, 2' has a socket 3. A first fuse 6 is provided in the lower fuse tube 2 and a final fuse 6' is provided in the upper fuse tube 2', in which the first fuse 6 is linked with the inner fuse 7 from the first firing shot tube A and the final fuse 6' is linked with the inner fuse 7' from the final firing shot tube T. In other words, the structure inside firework unit as we mentioned: its tubes are linked together as sequence A,B,C.....R,S,T through inner fuse 7. And the first shot tube A links with the fuse 6 in the lower paper fuse tube 2 through the inner fuse 7, and the final shot tube T links with fuse 6' in the upper paper fuse tube 2' through the inner fuse 7'. With the above-mentioned structure of the fireworks unit, a basis connection system between the lower and upper paper fuse tube 2, 2' and the shot tubes 1 is obtained.

As shown in Figures 3 and 4, there are two firing modes if the firework units with the above-mentioned structure are operated.

As shown in Figure 3, two adjacent firework units link together with the lower paper fuse tubes 2 and the lower paper fuse tube 2' to be connected in series attached fashion. A soft fuse hose L contains an outer fuse is inserted in one of the sockets 3 of the lower fuse tube 2 of a fireworks unit, a soft fuse hose L containing the outer fuse is inserted in one of the sockets 3 of the upper fuse tube 2' of the fireworks unit and inserted in one of the sockets 3 of the lower fuse tube 2 of the other fireworks unit, a said soft fuse hose L containing the outer fuse is inserted in

one of the sockets 3 of the upper fuse tube 2' of the other fireworks unit, so that the group firing system is connected in series attached fashion.

In this occasion, when the fuse 6 within the lower paper fuse tube 2 is fired, it transfers the fire through the inner fuse 7 from the first shot tube to the final shot tube (A to T), then, through the inner fuse 7' from the final shot to the fuse 6' in the upper paper fuse tube 2', to fire the soft fuse hose L containing outer fuse between the first fireworks unit and the next fireworks unit, to fire all of the shot tubes 1 (A to T) of the next fireworks unit. With this connection, several adjacent firework units can be fired one by one, that is, in series firing mode.

As shown in figure 4, two fireworks unit link together with the lower fuse tubes 2 to be connected in parallel attached fashion. A said soft fuse hose L containing the outer fuse is inserted in one of the sockets 3 of the lower fuse tube 2 of a fireworks unit, a said soft fuse hose L containing the outer fuse is inserted in the other socket 3 of the lower fuse tube 2 and inserted in one of the sockets 3 of the lower fuse tube 2 of the other fireworks unit, a said soft fuse hose L containing the outer fuse is inserted in the other socket 3 of the lower fuse tube 2 of the other fireworks unit, so that the group firing system is connected in parallel attached fashion.

In this occasion, when the fuse 6 within the paper fuse tube 2 is fired, it transfers the fire to the next firework unit through the soft fuse hose containing the outer fuse, and meanwhile, the shot tubes 1 (A to T) of the first fireworks unit by the inner fuse 7. Therefore, the adjacent fireworks units are fired simultaneously, that is, in a parallel firing mode.

As shown in the attached Figure 1, an embodiment of the group firing system of the present invention is illustrated. The connection firework group is composed of three sets of the different fireworks units  $A_1, A_2, A_3, A_4, B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9, C_1, C_2$ . These different firework units are linked by 1 to 2 paper fuse tubes 2,2' within their inner structure and some soft fuse hoses L with fuses outside to form a display group. If firework unit  $B_1$  shown in the upper portion in the figure is taken as the first ignited firework in the group, it can be known that firework unit  $B_1$  is serially connected with firework units  $B_2, A_4, C_1, A_1$  through the paper fuse tubes and the soft fuse hoses  $L_1, L_2, L_3, L_4$ . Since  $A_1$  has two paper fuse tube 2, 2',  $L_4$  is connected to  $B_4, B_5, B_6, A_2$  through soft fuse hose  $L_6, L_7, L_8, L_9$  with the lower paper fuse tube 2', while  $A_1$  is connected to  $B_3$  through soft fuse hose  $L_5$  with its upper paper fuse tube 2. By the same way, after the soft fuse tube  $L_9$  is connected to  $A_2$ , it also is connected to  $B_7$  through paper fuse tube ) and  $L_{10}$ , at the same time, it is connected to  $C_2$  through  $L_{11}$  and upper paper fuse tube ), and is connected to  $A_3, B_8, B_9$  through  $L_{12}, L_{13}, L_{14}$ .

It can be known that the conventional firework units can be combined into various connection systems by changing the structure thereof, that is, it can be connected in series connection or parallel connection. The resulted firing pattern may be in block-shape or characters-shape.

Furthermore, the present invention would be the structure as shown in Figure 7. In which, there is just one paper fuse tube in the fireworks unit, which is used to form series connection. Therefore, the fireworks unit with the one paper fuse tube is just fired together with the other fireworks units in parallel firing mode.



As shown in the attached Figure 1, the connection firework group is composed of three sets of the different fireworks units  $A_1, A_2, A_3, A_4, B_1, B_2, B_3, B_4, B_5, B_6, B_7, B_8, B_9, C_1, C_2$ . These different firework units are linked by 1 to 2 paper fuse tubes 2, 2' within their inner structure and some soft fuse hoses L with fuses outside to form a display group. If firework unit  $B_1$  shown in the upper portion in the figure is taken as the firstly ignited firework, in the group, it can be known that firework unit  $B_1$  is serially connected with firework units  $B_2, A_4, C_1, A_1$ , through the paper fuse tubes and the soft fuse hoses  $L_1, L_2, L_3, L_4$ . Since  $A_1$  has two paper fuse tube 2, 2',  $L_4$  is connected to  $B_4, B_5, B_6, A_2$ , through soft fuse hose  $L_6, L_7, L_8, L_9$  with the lower paper fuse tube 2', while  $A_1$  is connected to  $B_3$ , through soft fuse hose  $L_5$  with its upper paper fuse tube 2. By the same way, after the soft fuse tube  $L_9$  is connected to  $A_2$ , it also is connected to  $B_7$ , through paper fuse tube) and  $L_{10}$  at the same time, it is connected to  $C_2$ , through  $L_{11}$  and upper paper fuse tube), and is connected to  $A_3, B_8, B_9$ , through  $L_{12}, L_{13}, L_{14}$ .

It can be known that the conventional firework units can be combined into various connection systems by changing the structure thereof, that is, it can be connected in series connection or parallel connection. The resulted firing pattern may be in block shape or characters shape.

Certainly, the reason that we would carry out this system is that we have changed the firework' structure. It is composed of some shot tubes 1. It is installed with 1-2 paper fuse tubes 2, 2'. And the structure between paper fuse tube 2, 2' and the shot tube 1 as shown in Figures 5, 6.

When two paper fuse tubes 2, 2' with the fuse 6 are provided in the firework unit, the fuse 6 in the lower paper fuse tube 2' links the first shot tube A, at the same

time, it links with another firework unit through lower paper fuse tube 2', its socket 3, soft fuse hose L.

The structure inside firework unit as we mentioned: its tubes are linked together as sequence A, B, C ... R, S, T through inner fuse 7. And the final shot tube T links with fuse 6 in the paper fuse tube 2 through the derivative fuse 6'.

Therefore, the basis connection system between the paper fuse 2, 2' and the short tubes 1 is as follows:

With the derivative fuse 6' of the fuse 6 within the paper fuse tube 2', which is firstly links with the first shot tube A, then links with inner fuse 7 to connect the shot tubes A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T with together in series. This connection mode is substantially the same as that of conventional firework unit connected one by one with inner fuse 7. The difference therebetween is that: the derivative fuse 6' in the final shot tube is connected with the fuse 6 in the upper paper fuse tube 2.

Thus, there are two firing modes in series if the firework units are operated with the structure of the present invention:

1. Two adjacent firework units link together with the lower paper fuse tubes 2' and are set off (Fig. 4.).

In this occasion, when the fuse 6 within the paper fuse tube 2' is fired, it transfers the fire to the next firework unit, meanwhile it fires the shot tubes A, B, C, ... R, S, T through the derivative fuse 6' of the fuse 6. Several adjacent firework units can be fired in short time, that is, in parallel firing mode.

~~2. Two adjacent firework unit link together with the upper paper fuse tube 2 and the lower paper fuse tube 2' (Fig. 3) and set off.~~

~~In this occasion, when the fuse 6 within the paper fuse tube 2 is fired, it transfers the fire to the next firework unit. Otherwise, (if the fire is not directly transferred to the next firework unit) it fires the shot tube T in the firework unit through the derivative fuse 6' of the fuse 6, and the shot tubes A, B, C, ... R, S, T will be fired through the inner fuse 7. Finally, the fire is transferred to the new firework unit through the fuse 6 in the lower paper fuse tube 2' in series firing mode, that is, the next firework unit will not be fired until the preceeding firework unit is burned out.~~

~~When the fuse 6 inside the Upper Paper Fuse Tube (2) was fired, it would transfer the fire to the next one. On the other hand the fuse (6') inside the Paper Fuse Tube (6) would light the Shot Tube T, and it would display from S, R, Q, ... C, B, A, finally the fire would transfer to next one through the Below Paper Fuse Tube (2'), therefore, the fireworks would be fired one by one, that is serial system.~~

~~Furthermore, the present invention would be the structure as shown in Figure 7. In which, there is just one paper fuse tube in the firework unit, which is used to form series connection. Therefore, the firework unit with the one paper fuse tube is just fired together with the other firework units in parallel firing mode.~~